

Name:

Date:

Exam: Function Reflections (Solution version 629)

1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) = 6x^5 - 4x^4 + 3x^3 + 2x^2 + 8x - 9$$

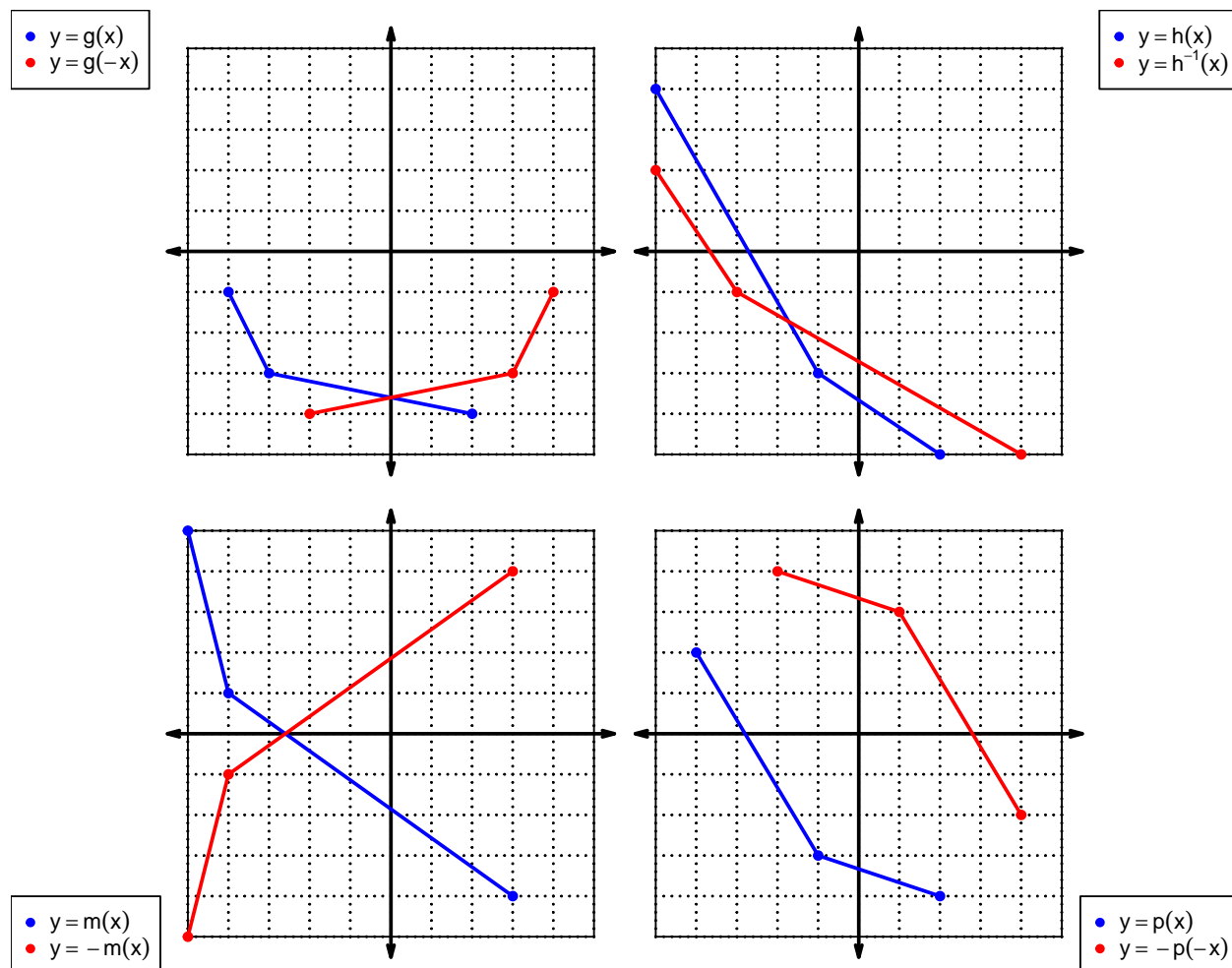
Draw lines that match each function reflection with its polynomial:

Reflections

Polynomials

| | | | |
|----------|---|---|---------------------------------------|
| $-f(-x)$ | • | • | $-6x^5 - 4x^4 - 3x^3 + 2x^2 - 8x - 9$ |
| $f(-x)$ | • | • | $6x^5 + 4x^4 + 3x^3 - 2x^2 + 8x + 9$ |
| $-f(x)$ | • | • | $-6x^5 + 4x^4 - 3x^3 - 2x^2 - 8x + 9$ |

2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f , g , and h are defined by the table below.

| x | $f(x)$ | $g(x)$ | $h(x)$ |
|-----|--------|--------|--------|
| 1 | 5 | 9 | 3 |
| 2 | 8 | 1 | 9 |
| 3 | 9 | 2 | 4 |
| 4 | 6 | 8 | 1 |
| 5 | 2 | 7 | 8 |
| 6 | 7 | 3 | 5 |
| 7 | 3 | 4 | 2 |
| 8 | 1 | 5 | 6 |
| 9 | 4 | 6 | 7 |

3. (worth 3 points) Evaluate $f(1)$.

$$f(1) = 5$$

4. (worth 3 points) Evaluate $g^{-1}(2)$.

$$g^{-1}(2) = 3$$

5. (worth 3 points) Assuming h is an **odd** function, evaluate $h(-9)$.

If function h is odd, then

$$h(-9) = -7$$

6. (worth 3 points) Assuming f is an **even** function, evaluate $f(-6)$.

If function f is even, then

$$f(-6) = 7$$

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7. (worth 15 points) A function, f , is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g , is **odd** if $g(x) = -g(-x)$ for all x in the domain.

Let polynomial p be defined with the following equation:

$$p(x) = x^3 + 1$$

- a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = (-x)^3 + 1$$

$$p(-x) = -x^3 + 1$$

- b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -(-x^3 + 1)$$

$$-p(-x) = x^3 - 1$$

- c. Is polynomial p even, odd, or neither?

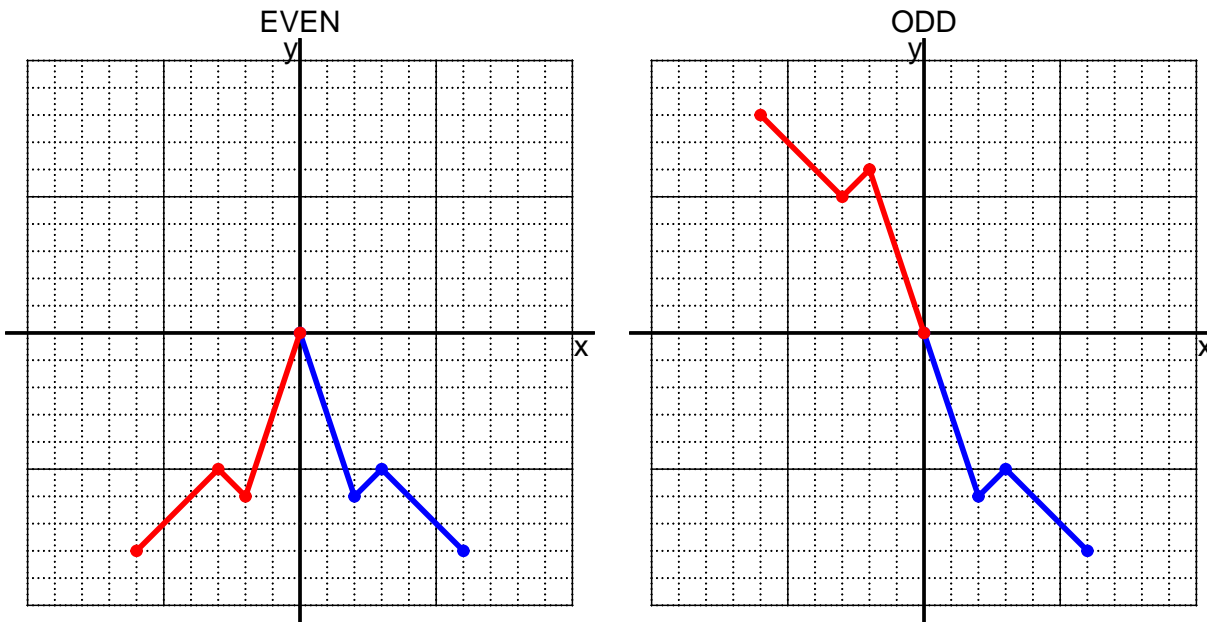
neither

- d. Explain how you know the answer to part c.

We see that $p(x)$ is not equivalent to either $p(-x)$ or $-p(-x)$, so p is neither even nor odd.

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8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = \frac{x}{5} + 4$$

- a. Evaluate $f(25)$.

step 1: divide by 5
step 2: add 4

$$f(25) = \frac{(25)}{5} + 4$$

$$f(25) = 9$$

- b. Evaluate $f^{-1}(16)$.

step 1: subtract 4
step 2: multiply by 5

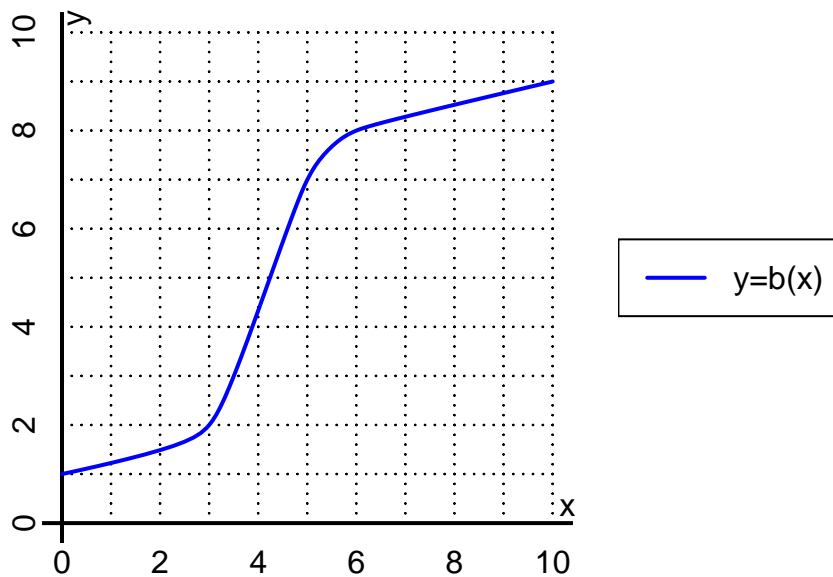
$$f^{-1}(x) = 5(x - 4)$$

$$f^{-1}(16) = 5((16) - 4)$$

$$f^{-1}(16) = 60$$

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10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(3)$.

$$b(3) = 2$$

b. Evaluate $b^{-1}(7)$.

$$b^{-1}(7) = 5$$

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11. (worth 18 points) Function f is defined by the table below.

a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

| x | $f(x)$ | $-f(x)$ | $f(-x)$ | $-f(-x)$ |
|-----|--------|---------|---------|----------|
| -2 | 9 | -9 | -9 | 9 |
| -1 | -7 | 7 | 7 | -7 |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 7 | -7 | -7 | 7 |
| 2 | -9 | 9 | 9 | -9 |

b. Is function f even, odd, or neither?

odd

c. How do you know the answer to part b?

Function f is odd because column $-f(-x)$ matches column $f(x)$ exactly.